Title: Family Sports Day

Brief Overview:

In this unit the students will demonstrate their knowledge of fractions, patterns, addition and subtraction. They will use logic and reasoning skills to solve problems as they work to plan a family sports day.

NCTM 2000 Principles for School Mathematics:

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*
- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*
- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*
- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*
- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*
- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

- **Content Standards**

<u>Algebra</u>

- *Understand patterns, relationships, and functions.*
- *Use mathematical models to represent and understand quantitative relationships.*

<u>Geometry</u>

- *Use visualization, spatial reasoning, and geometric modeling to solve problems.*

<u>Measurement</u>

- *Understand measurable attributes of objects and the units, systems, and processes of measurement.*

- **Process Standards**

<u>Problem Solving</u>

- *Instructional programs from prekindergarten through grade 12 should enable all students to apply and adapt a variety of appropriate strategies to solve problems.*

Reasoning and Proof

- *Instructional programs from prekindergarten through grade 12 should enable all students to recognize reasoning and proof as fundamental aspects of mathematics; and select and use various types of reasoning and methods of proof.*

Communication

- *Instructional programs from prekindergarten through grade 12 should enable all students to communicate their mathematical thinking coherently and clearly to peers, teachers, and others; and use the language of mathematics to express mathematical ideas precisely.*

Connections

- *Instructional programs from prekindergarten through grade 12 should enable all students to understand how mathematical ideas interconnect and build on one another to produce a coherent whole; and recognize and apply mathematics in contexts outside of mathematics.*

Representation

- *Instructional programs from prekindergarten through grade 12 should enable all students to create and use representations to organize, record, and communicate mathematical ideas.*

Grade/Level:

Grades 2-4. This unit can be completed with teacher guidance or independently depending on the level of the group.

Duration/Length:

Four days for 45-60 minutes per day.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Identifying, adding, and subtracting fractions
- Adding and subtracting money
- Continuing patterns
- Understanding area as a measurable unit
- Repeated addition or multiplication
- Writing to persuade
- Basic calculator skills

Student Outcomes:

Students will:

- Create and extend patterns.
- Count to find area.
- Organize and display data using a grid.
- Read, write and represent whole numbers and fractions.
- Add and subtract whole numbers with regrouping.
- Use repeated addition or multiplication to solve problems.
- Make a plan and decide what information and steps are needed to solve problems.
- Select and then apply appropriate problem-solving strategies to solve a problem from visual, numerical, and symbolic perspectives.
- Use mathematical language to describe ideas and results in written form.
- Justify why an answer or approach to a problem is reasonable.

Materials/Resources/Printed Materials:

- Copy of student resource sheets for each student
- Teacher resource sheets
- Colored tiles
- Colored pencils or crayons
- Calculators (optional)

Development/Procedures:

Day 1 – Patterns

- **Student Resource Sheets #1 and 2 can be distributed prior to or after a discussion about advertisements.**
- **Be sure that students have an understanding of the word advertisement before they complete this activity.**

- Tell students that they will be planning a family sports day. Ask the students to talk with a partner about what would be needed to have a family sports day.
- Give the students 5 minutes to brainstorm with their partner.
- After 5 minutes have partners share their list while you make a class list on the board.
- Tell the students that the principal will not approve a family sports day until we have planned it and persuaded him.
- Distribute Student Resource Sheet #1, which will explain the directions, information, and steps for making an advertisement for our family sports day. See Teacher Resource Sheet #1 for answers.
- Distribute Student Resource Sheet #2, which is a blank advertisement that the students will need to fill in using the information gained from the directions.
- Allow students to share their advertisements and explain the patterns that they used.

Day 2 – Money

- Tell the students that they will be using their knowledge of money, addition, subtraction, and problem solving to decide how much food they will need to purchase for their family sports day.
- Distribute manipulatives (calculators - if needed) to the students, which will be helpful in problem solving.
- Distribute Student Resource Sheets #3 and 4, which contain a variety of problem solving situations dealing with money. See Teacher Resource Sheets #2 and 3 for answers.
- Guide the students (if necessary), or ask the students to work with a partner and use various strategies to solve each problem. Students may want to double-check their answers to some problems by using the calculator.
- If desired, ask for volunteers to share their written explanations of answers to each problem, and the strategies they used.

Day 3 – Spatial- reasoning and fractions

- Tell the students that they will be given a grid with which they will create a map of the playground.
- Tell the students that they will use this grid to decide where each sports activity would best fit.
- Distribute Student Resource Sheet #5, which contains the information and the grid that the students will use to complete this task. Answers may be found on Teacher Resource Sheet #4.
- Distribute colored tiles, which the students will use to decide where each sports activity should be set up.
- Guide the students (if necessary) through the steps that they will need to take to complete the grid.
- Distribute Student Resource Sheet #6. Ask the students to answer questions relating to their grid. Students will also write two statements about their grid using fractions. For example, there are 20 squares on the grid, if 4 squares were used for kickball the student might write, "4/20 of my grid is used for kickball."
- Ask for volunteers to share their grid with the class. Answers may vary.

Day 4 – Writing to persuade

- Now that the students have finished planning for Family Sports Day, they will need to present the information to their principal for approval. Tell the students that they will write a letter to their principal persuading him or her to allow them to have Family Sports Day.
- Distribute Student Resource Sheet #7. Guide students to find the form, audience, topic and purpose for writing.
- Distribute Student Resource Sheet #8. Have the students write their letters, making sure to include the information that they have planned and good reasons why the principal should allow them to have this event.
- If there is time, allow the students to share their writing with the class.

Performance Assessment:
There are teacher resource sheets to accompany most student resource sheets. Math explanations on Student Resource Sheets #1, 4, and 6, can be scored using the mathematics rubric on Teacher Resource Sheet #6. The persuasive letter can be scored using the writing rubric on Teacher Resource Sheet #7.

Extension/Follow Up:

- Have the students work together to plan a different event of interest such as a school carnival.

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Family Sports Day

Your class would like to have a Family Sports Day. Your school principal thinks that it sounds like a great idea, but would like for your class to plan everything before he will give his approval.

Your class has decided that in order for the day to be a success, you will need to inform everyone about Family Sports Day.

1. List some ways that your class could inform everyone about the fun day that you are planning.

_____

_____

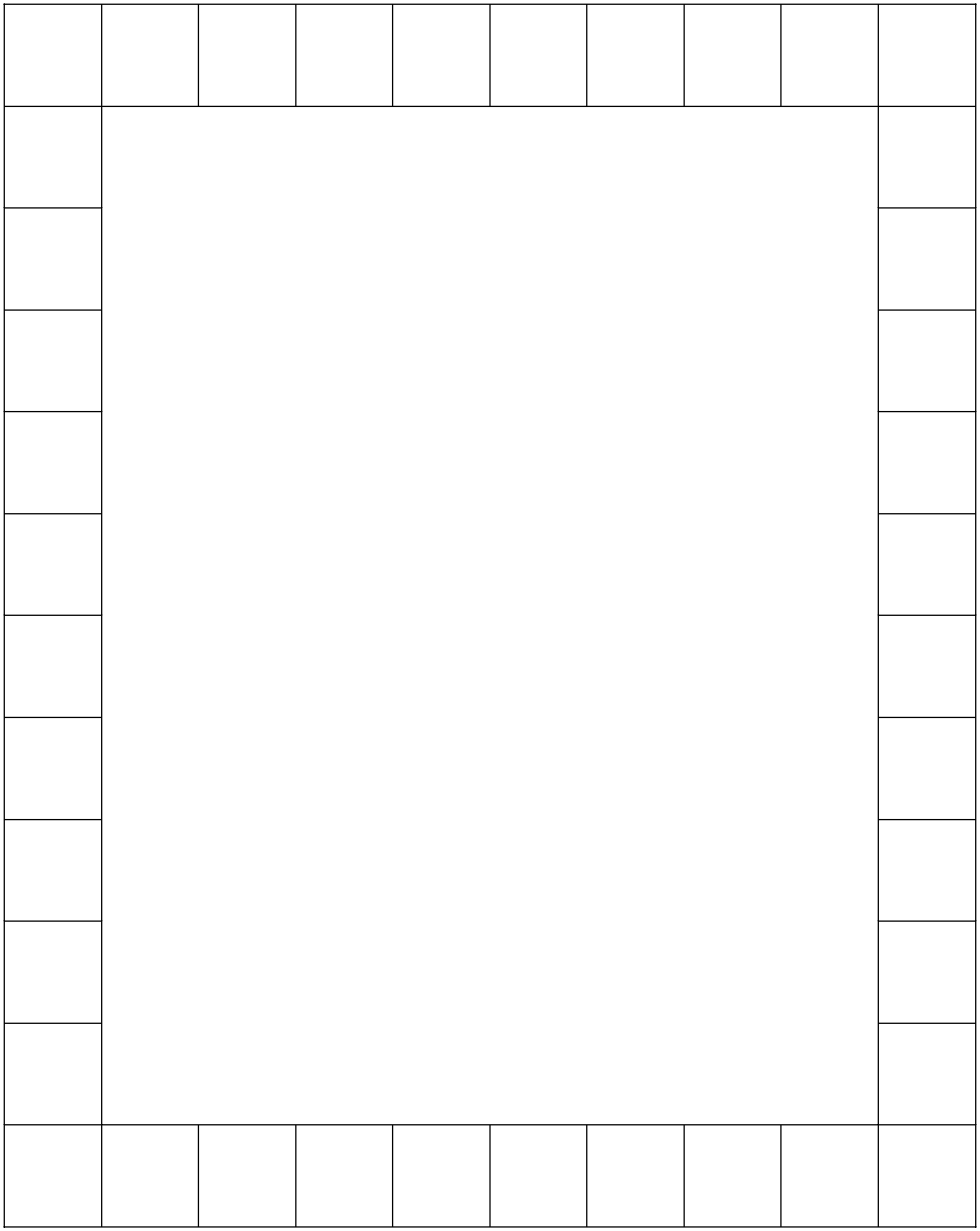
Your class has decided to plan Family Sports Day for Saturday, May 21st from 12:00 – 3:00. There will be soccer and kickball games, relay races, and even a four square game. Food will be sold in case anyone gets hungry or would like something to drink. If it rains, Family Sports Day will be moved to Saturday, May 28th.

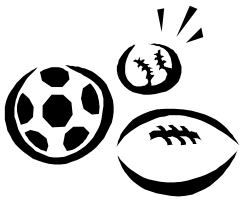
Your class has decided to create a banner or flyer to advertise for Family Sports Day. Use the next page to create a flyer that could be displayed in the community. Be sure to include all of the important information that people would need to know. Use the spaces provided to create a border, which has a repeating pattern, around the outside edge of your flyer.

2. Explain the pattern you chose.

_____

_____





Family Sports Day

Your class would like to raise money by selling food and beverages at Family Sports Day. Parent volunteers have offered to cook hotdogs and sell drinks. Your class has estimated that about 100 people will attend Family Sports Day. The chart below shows the cost of each item that need to be purchased.

Item	Cost
Hotdogs	$1.75 for pack of 10
Hotdog buns	$3.25 for pack of 20
Plates	$2.50 for pack of 75
Napkins	$2.25 for pack of 150
Soda	$6.50 for pack of 24 (cans)

Your class needs to purchase the above items for 100 people. Use the information in the chart to calculate how much to purchase and the total cost. Complete the chart below.

Item	Total packs needed	Cost per pack	Total Cost
Hotdogs		$1.75	
Buns		$3.25	
Plates		$2.50	
Napkins		$2.25	
Soda		$6.50	
********** *****	********** *****	********** *****	

Family Sports Day

Answer each question below. Be sure to use mathematical language to explain your thinking.

1. Explain how you figured the total cost of 100 hotdogs.

_____
_____
_____
_____
_____

2. How many packages of plates will you need to purchase? Explain how you know.

_____
_____
_____
_____
_____

3. Your principal has agreed to give you $80 to purchase the food for Family Sports Day. Will you have enough money to purchase everything that you need? Explain how you know.

_____
_____
_____
_____
_____
_____
_____

Family Sports Day

The grid below represents the school playground. The chart below shows how much room each sport will need on the playground. Each box is equal to 10 square feet. Arrange your colored tiles on the playground in the way that you feel the sport activities should be set up for Family Sports Day.

Sport Activity	Space Needed	Color Tile
Soccer	80 square feet	Red
Relay Races	40 square feet	Green
Kickball	40 square feet	Yellow
Four Square	20 square feet	Blue

School Playground

*After arranging your tiles, color the diagram to show where each sports activity should be set up.

Family Sports Day

Answer the following questions about your Family Sports Day playground plan. Be sure to explain your thinking.

1. What fraction of the playground is not being used? Explain how you know.

_____
_____
_____
_____

2. We still need 10 square feet for the food station. Write the word ***food*** in the area where the food station should be set up.

_____
_____
_____
_____

3. We still have 10 square feet left. Make a list of some ways that we could use this space.

_____
_____

4. What fraction of the playground is being used for soccer? _____ Now write two more statements about your playground plan using fractions.

_____
_____
_____
_____
_____

Family Sports Day

Write to Persuade

You have just finished planning and gathering information about Family Sports Day. Today you will be writing to persuade your principal to allow you to have this special event.

Before you begin to write, think about:

- How you will advertise.
- How much it will cost to purchase the food and beverages.
- How you will organize the games on the field.
- Reasons why you should have this event.

FORM

AUDIENCE

TOPIC

PURPOSE

Family Sports Day

_____

Date

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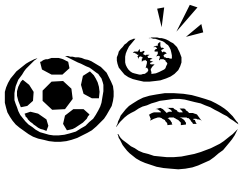

Family Sports Day

Your class would like to have a Family Sports Day. Your school principal thinks that it sounds like a great idea, but would like for your class to plan everything out before he will give his approval.

Your class has decided that in order for the day to be a success you will need to let everyone know about Family Sports Day.

1. List some ways that your class could let everyone know about the fun day that you are planning.

Answers may vary. Possible answers include hanging up flyers, advertising in the paper or on the radio, hanging up a banner.

Your class has decided to plan Family Sports Day for Saturday, May 21st from 12:00 – 3:00. There will be soccer and kickball games, relay races and even a four square game. Food will be sold in case anyone gets hungry or would like something to drink. If it rains Family Sports Day will be moved to Saturday, May 28th.

Your class has decided to create a banner or flyer to advertise for Family Sports Day. Use the next page to create a flyer that could be displayed in the community. Be sure to include all of the important information that people would need to know. Use the spaces provided to create a border, which has a repeating pattern, around the outside edge of your flyer.

2. Explain the pattern you chose.

Answers may vary. Score using rubric on teacher resource sheet #6.

Family Sports Day

Your class would like to raise money by selling food and beverages at Family Sports Day. Parent volunteers have offered to cook hotdogs and sell drinks. Your class has estimated that about 100 people will attend Family Sports Day. The chart below shows the cost of each item that needs to be purchased.

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Plates	$2.50 for pack of 75
Napkins	$2.25 for pack of 150
Soda	$6.50 for pack of 24 (cans)

Your class needs to purchase the above items for 100 people. Use the information in the chart to calculate how much to purchase and the total cost. Complete the chart below.

Item	Total packs needed	Cost per pack	Total Cost
Hotdogs	*10*	$1.75	*$17.50*
Buns	*5*	$3.25	*$16.25*
Plates	*2*	$2.50	*$5.00*
Napkins	*1*	$2.25	*$2.25*
Soda	*5*	$6.50	*$32.50*
**********	**********	**********	*$73.50*

Family Sports Day

Answer each question below. Be sure to use mathematical language to explain your thinking.

1.Explain how you figured out the total cost to purchase 100 hotdogs.

Students should explain how they calculated to find the number of packs needed (repeated addition or multiplication). They should explain how they calculated to get the total price. Answers may vary. Score using the rubric on teacher resource sheet #6.

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2. How many packages of plates will you need to purchase? Explain how you know.

2 packages – Student explanations may vary. Score using the rubric on teacher resource sheet #6.

3.Your principal has agreed to give you $80 to purchase the food for Family Sports Day. Will you have enough money to purchase everything that you need? Explain how you know.

Yes, we will have enough money. Students should explain that they added to find the total cost of the food, which totals to $73.50. Score using the rubric on teacher resource sheet #6.

Family Sports Day

Answer the following questions about your Family Sports Day playground plan. Be sure to explain your thinking.

1. What fraction of the playground is not being used? Explain how you know.

2/ 20. Students should explain that 18 squares were being used for sports activities. That leaves 2 squares left over, with 20 squares in all. Score using rubric on teacher resource sheet #6.

2. We still need 10 square feet for the food station. Write the word ***food*** in the area where the food station should be set up.

Answers will vary.

1. We still have 10 square feet left. Make a list of some ways that we could use this space.

Answers may vary. Some possible answers include bathroom or picnic area.

2. What fraction of the playground is being used for soccer?____*8/20*___ Now write two more statements about your playground plan using fractions.

Answers may vary, but should accurately represent the information in their grid. Score using rubric on teacher resource sheet #6.

Family Sports Day

Write to Persuade

You have just finished planning and gathering information about Family Sports Day. Today you will be writing to persuade your principal to allow you to have this special event.

Before you begin to write think about:

- How you will advertise.
- How much it will cost to purchase the food and beverages.
- How you will organize the games on the field.
- Reasons why you should have this event.

FORM

Letter

AUDIENCE

School principal

TOPIC

Family Sports Day

PURPOSE

To persuade

Family Sports Day

Mathematics Rubric for Scoring Items
2-point rubric

Level 2	The answer is correct and the explanation or response shows a complete understanding of the problem.
Level 1	The response shows a reasonable approach or strategy for solving the problem. It may or may not lead to a correct answer. The response demonstrates an adequate understanding of the problem.
Level 0	The answer is completely incorrect or irrelevant. There may be no response or the response, “I don’t know.”

Family Sports Day

Writing to Persuade Scoring Rubric
3 Point Rubric

Level 3	Writing is clear, containing complete sentences, and includes well-developed details/reasons. Student uses proper letterform, correct punctuation, capitalization, and spelling.
Level 2	Writing is relatively clear, containing complete sentences, and includes somewhat developed details/reasons. Student uses adequate letterform, punctuation, capitalization, and spelling.
Level 1	Student makes attempt, but writing may be unclear or with undeveloped details/reasons. Writing contains many grammatical errors.
Level 0	Student makes no attempt, writing is illegible, or totally off topic.